CRESCENT LAKE

2013 SAMPLING HIGHLIGHTS

WOLFEBORO, NH

NEW HAMPSHIRE
LAKES LAY MONITORING

Crescent Lake volunteers collected water quality data between April 16 and September 11, 2013. A more in depth water quality survey of the Crescent Lake deep sampling station was conducted by the Center for Freshwater Biology on August 5, 2013.

Blue = Excellent = Oligotrophic

Yellow = Fair = Mesotrophic

Red = Poor = Eutrophic

Light Gray = No Data

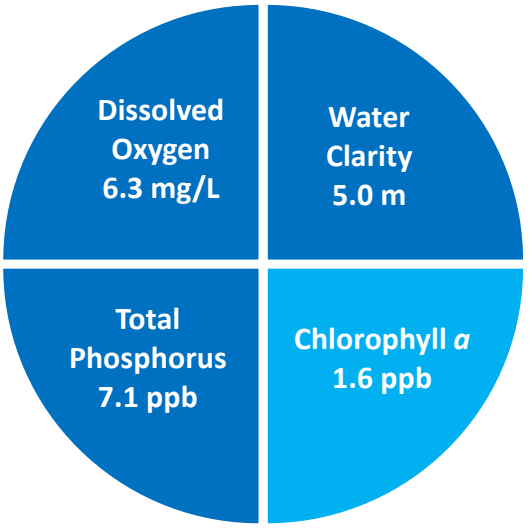


Figure 1. Average Water Quality Conditions

2013 RESULT HIGHLIGHTS

WATER CLARITY: Water clarity, measured as Secchi disk depth, averaged 5.0 meters (m) in Crescent Lake. The 2013 Lake Crescent Lake water clarity was similar to the 2012 water clarity.

CHLOROPHYLL: Chlorophyll *a*, a measure of microscopic plant life within the lake, averaged 1.6 parts per billion (ppb) in Crescent Lake. The 2013 Crescent Lake chlorophyll *a* concentration was lower (less algal greeness) than the 2012 level.

TOTAL PHOSPHORUS: Phosphorus is the nutrient most responsible for microscopic plant growth. Total phosphorus concentrations taken from the surface waters averaged 7.1 parts per billion (ppb) and remained below 10 ppb. A total phosphorus concentration of 10 ppb is considered sufficient to support green water events that are referred to as algal blooms.

DISSOLVED OXYGEN: Dissolved oxygen is important for healthy fisheries. Dissolved oxygen concentrations collected in Crescent Lake ranged from 3.7 to 8.3 milligrams per liter (mg/L) on August 5 2013. Dissolved oxygen concentrations were lower near the lake bottom. However, all dissolved oxygen concentration remained above 3 mg/L. A dissolved oxygen concentration of 3.0 mg/l is considered the threshold for the growth and reproduction of warm water fish such as bass and perch.

COLOR: Color is a result of naturally occurring "tea" color substances from the breakdown of soils and plant materials. The Crescent Lake color averaged 26.7 color units (CPU).

ALKALINITY: Alkalinity measures the resistance the lake has against acid rain. The Crescent Lake alkalinity averaged 8.0 milligrams per liter (mg/L) and indicates a moderate vulnerability to acid rain. The Crescent Lake **pH**, a measure of lake acidity, ranged from 6.8 to 7.0 units in the surface waters and remained within the acceptable range for most aquatic organisms on the August 5, 2013 sampling date.

SPECIFIC CONDUCTIVITY: Specific conductivity is a general indicator of pollution. Specific Conductivity ranged from 59.0 to 64.0 micro-Siemans per centimeter (*u*S/cm) in the Crescent Lake surface waters. The Crescent Lake specific conductivity indicates low to moderate concentrations of dissolved substances such as nutrients (e.g. phosphorus and nitrogen) and other dissolved salts (e.g. sodium and chloride).

CYANOBACTERIA: Crescent Lake did not take part in the 2013 cyanobacteria monitoring program. Please refer to the recommendation section for further information

Note: Site 6 Center (see map) was used as the reference point to give an overall representation of the Crescent Lake water quality discussed above. For a more detailed discussion of water quality measurements, please refer to the executive summary within the annual Lake Wentworth report.

Table 1. 2013 Crescent Lake Seasonal Average Water Quality Readings and Trophic Level Classification Criteria used by the New Hampshire Department of Environmental Services

Parameter	Oligotrophic "Excellent"	Mesotrophic "Fair"	Eutrophic "Poor"	Crescent Lake Average (range)	Crescent Lake Classification
Water Clarity (meters)	4.0 – 7.0	2.5 - 4.0	< 2.5	5.0 meters (range: 4.5 – 5.7)	Oligotrophic
Chlorophyll *a* (ppb)	< 3.3	> 3.3 – 5.0	> 5.0 – 11.0	1.6 ppb (range: 0.6 – 2.5)	Oligotrophic
Total Phosphorus (ppb)	< 8.0	> 8.0 – 12.0	> 12.0 – 28.0	7.1 ppb (range: 7.0 – 8.7)	Oligotrophic
Dissolved Oxygen (mg/L)	5.0 – 7.0	2.0 – 5.0	<2.0	* 6.3 mg/L (range: 3.7 – 7.6)	Oligotrophic
Cyanobacteria (cell counts, microcystin concentration & Water safety)	The Massachusetts Department of Public Health considers dangerous microcystin (MC) levels to be 14 micrograms per liter (*u*g/l) lake water, and/or 70,000 cyanobacteria cells per milliliter lake water.		The New Hampshire Department of Environmental services posts warnings at State beaches when cyanobacteria cell numbers exceed 70,000 cells per milliliter lake water.		

*** Dissolved oxygen concentrations measured in the zone of rapid temperature decrease (thermocline).**

LONG TERM TRENDS

WATER CLARITY: The Crescent Lake water clarity data display a trend of decreasing water clarity over the past thirty years. The trend is not statistically significant. *Note: Due to the shallowness of Crescent Lake, some water clarity measurements have historically been visible on the lake bottom.*

CHLOROPHYLL: The Crescent Lake chlorophyll *a* data display a trend of decreasing concentrations over the past thirty years. The trend is statistically significant.

COLOR: The Crescent Lake color data display a trend of increasing color concentrations over the twenty six year period during which color data were collected (1987 – 2013). The trend is statistically significant.

TOTAL PHOSPHORUS: The Crescent Lake total phosphorus concentrations have increased over twenty-four year period during which total phosphorus data were collected (1986 – 2013). The trend is not statistically significant.

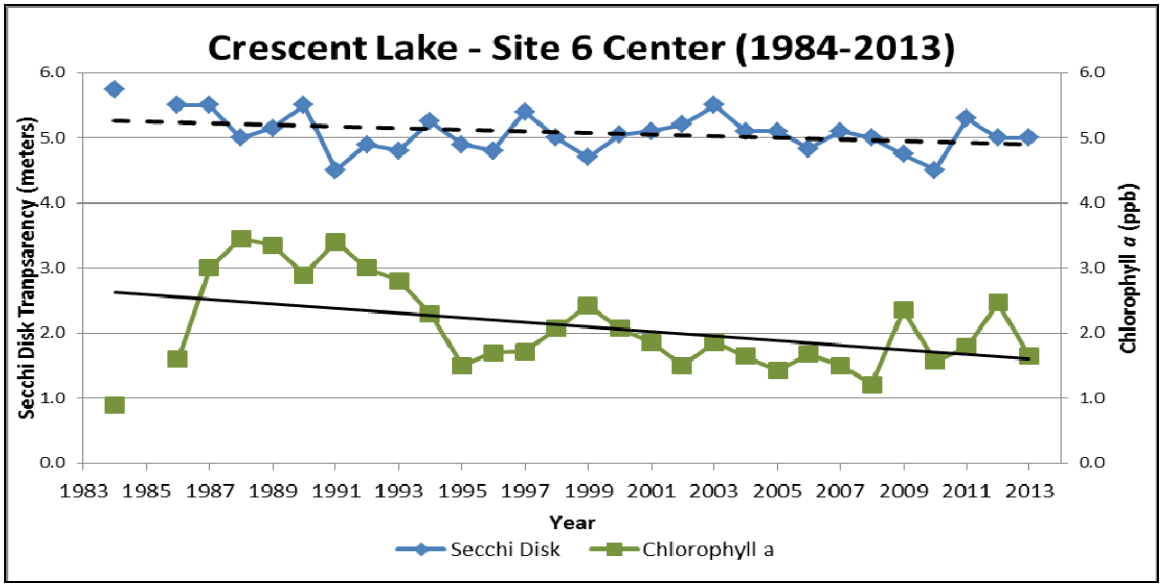


Figure 2. Changes in water clarity (Secchi disk depth) and chlorophyll *a* measured between 1984 and 2013 at Site 6 Center. The long-term water clarity data indicate a trend of decreasing water clarity (dashed line). The long-term algal growth (chlorophyll *a*) indicate a trend of decreasing concentrations (solid line). The long-term water clarity trend is not statistically significant while the long-term chlorophyll *a* trend is statistically significant.

Recommendations:

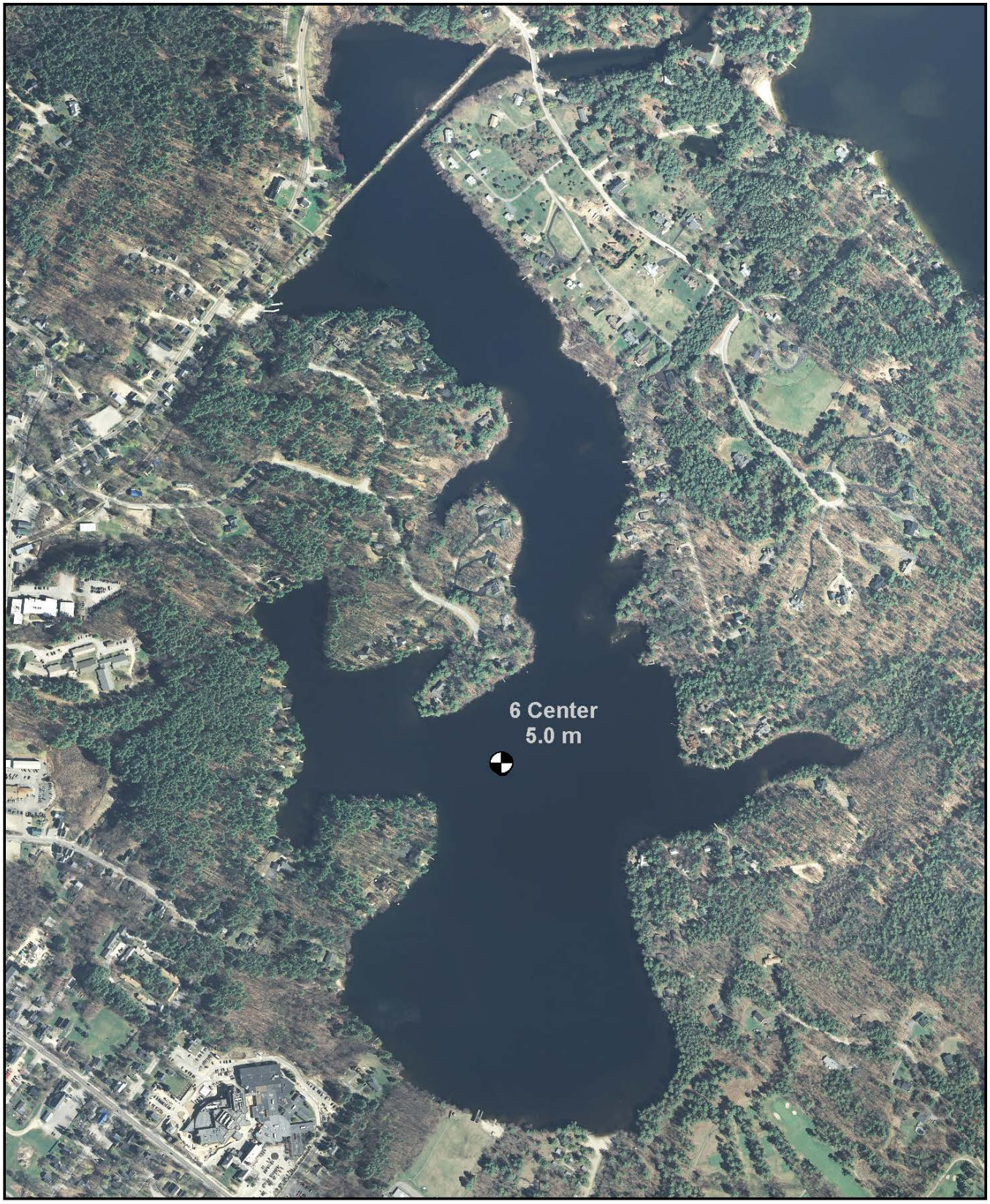
- Review the Lake Wentworth and Crescent Lake Watershed Management Plan that provides an assessment of the Crescent Lake water quality and discusses management strategies that can be taken to stabilize and improve water quality.
  http://des.nh.gov/organization/divisions/water/wmb/was/documents/lake-wentworth-crescent-lake.pdf

- Consider adding a simple cyanobacteria monitoring routine that is based on the existing water quality monitoring methods. Cyanobacteria collections throughout the summer and fall months can give insight as to how these populations are distributed throughout the seasons and when they are most likely to be at harmful levels. If you are interested in discussing additional water quality monitoring options that would meet your needs please contact Bob Craycraft @ 862-3696 or bob.craycraft@unh.edu.

Crescent Lake

Wolfeboro, NH

2013 Deep water sampling sites with average seasonal water clarity



Aerial Orthophoto Source: NH GRANIT
Site locations GPSed by the UNH Center of Freshwater Biology

University of New Hampshire
Cooperative Extension

New Hampshire Lakes Lay Monitoring